Journal of Infection and Public Health (2013) 6, 416—422

ELSEVIER
http://www.elsevier.com/locate/jiph

Annual point-prevalence of healthcare-associated infection surveys in a university hospital in China, 2007—2011

Duo-shuang Xie[a,b], Xiang-yun Fu[a], Hui-fang Wang[a], Lei Wang[c], Rui Li[a], Qin-qing Luo[a], Wei Xiong[d,*]

[a] *Department of Infection Control, Taihe Hospital, Hubei University of Medicine, Shiyan, Hubei, China*
[b] *Centre of Health Administration and Development Study, Hubei University of Medicine, Shiyan, Hubei, China*
[c] *Hospital Administration Office, Taihe Hospital, Hubei University of Medicine, Shiyan, Hubei, China*
[d] *Department of Infection Control, Tongji Hospital, Tongji Medical College of Huazhong University of Science and Technology, Wuhan, China*

Received 30 November 2012; received in revised form 24 April 2013; accepted 29 April 2013

KEYWORDS
Healthcare-associated infections;
Point-prevalence survey;
China

Summary Successive point-prevalence surveys were conducted annually from 2007 to 2011 to monitor the prevalence of healthcare-associated infections (HAIs) in a university hospital in Hubei Province in China. The surveys used the case definition criteria established by the Ministry of Health of the People's Republic of China. In the 5 surveys, the overall frequency of HAIs was 3.16% (301/9533). No significant differences were identified in the point prevalence measurements of HAIs in any of the years from 2007 to 2011. Of all the cases, proportionally, the most frequent infection site was the respiratory tract (2.34%), followed by surgical sites (0.43%) and urinary tract sites (0.28%). Gram-negative aerobic bacilli were the most common organisms mentioned; the most frequently isolated organism was *Pseudomonas aeruginosa*, followed by *Escherichia coli* and *Acinetobacter baumannii*. Approximately one-half of the patients were receiving antibiotics at the time of the surveys. Cephalosporin, penicillin, and quinolone were most commonly used for treatment or prevention. The differences found in HAI prevalence data across the 5 surveys given in the hospital were not statistically significant. In conclusion, this successive point-prevalence survey provides information about the trend of HAI prevalence, epidemical character, and the use of antibiotics among the university hospital's in-patients. This information allows us to initiate targeted programs for infection prevention and control.

* Corresponding author at: Department of Infection Control, Tongji Hospital, Tongji Medical College of Huazhong University of Science and Technology, No 1095 Jiefang Road, Wuhan, Hubei 430030, China. Tel.: +86 27 83663667; fax: +86 27 83663667.
E-mail address: tjxw2012@163.com (W. Xiong).

1876-0341/$ — see front matter © 2013 King Saud Bin Abdulaziz University for Health Sciences. Published by Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.jiph.2013.04.009

Introduction

Healthcare-associated infections (HAIs) are associated with prolonged hospital stays and increased healthcare costs attributable to more severe diseases [1,2]. Surveillance is an essential component of any comprehensive program for reducing HAIs [3,4]. Point-prevalence surveys, particularly successive ones, can provide a snapshot of HAI prevalence, including infection rates, main infection sites, common microorganisms, and the use of antibiotics [5]. This information can be used to establish priorities for infection prevention and control and to function as a tool for evaluating an HAI situation.

From 2007 onward, a point-prevalence survey was conducted annually to determine the characteristics of HAIs in Taihe Hospital, the affiliated hospital of Hubei University of Medicine in Shiyan City, Hubei Province, China. Given these surveys, we aimed to analyze trends of HAI prevalence, epidemical character, and the use of antibiotics among in-patients at the university hospital.

Methods

Case definition

Medical records were reviewed for HAIs using the definitions established by the Ministry of Health of the People's Republic of China, which were modified from the case definitions of the National Nosocomial Infection Surveillance System (NISS) [6]. The main modification concerned the categorizations of respiratory tract infection (RTI) cases and the case definitions of patients $\leq$12 months of age. In Chinese definitions, the definition of RTI included both the NISS categories of 'pneumonia', 'lower respiratory tract infection other than pneumonia', and 'upper respiratory infection', which was diagnosed and considered an HAI only if the patient had a fever higher than 38 °C. Otherwise, patients $\leq$12 months of age as a group were listed independently in the NISS HAI case definitions, while patients in China $\leq$12 months of age were included in the general criterion for HAI diagnosis, except for cardiovascular system infections and central nervous system infections.

These infections were classified into 7 groups: RTIs, urinary tract infections (UTIs), bloodstream infections (BSIs), surgical site infections (SSIs), alimentary canal infections (ACIs, including infectious diarrhea, gastrointestinal infection, antibiotic-associated diarrhea, viral hepatitis, abdominal or pelvic tissue infections, and ascites infections), skin and soft tissue infections (STIs), and other infections (including parotitis, chickenpox, nerve system infections, deep organ infections, and those HAIs not included in the aforesaid cases).

According to the criteria, an infection was considered an HAI if it was diagnosed 48 h or more after admission, provided there was no evidence that the infection was sub-clinical or undiagnosed at the time of admission. A patient was also considered an HAI case if he or she was still receiving treatment for a HAI and no longer met the criteria on the day of survey.

Study population

Taihe Hospital, also named the Affiliated Hospital of Hubei University of Medicine, was founded in 1965 and is a tertiary-stage hospital located in the City of Shiyan, Hubei Province of China. There were 1477 beds in 2007 and 2008, 1800 in 2009, and 2300 in 2010 and 2011 for adults and children in the hospital, with 50,853 admissions in 2007, 55,563 in 2008, 61,056 in 2009, 70,421 in 2010, and 86,387 in 2011. The hospital included a general intensive care unit (ICU) and represented all medical specialties. We divided the clinical departments into the following 5 groups: departments of internal medicine, departments of surgery, pediatrics, ICU, and others (consisting of Chinese traditional medicine, dentistry, ENT [ears, nose, and throat] medicine, ophthalmology, and dermatology). Point-prevalence surveys were conducted annually in November from 2007 to 2011. All patients in the hospital who had been hospitalized for at least 48 h at 8 a.m. on the days of the surveys or who had been admitted in the past 7 days were registered in the surveys.

Data collection

From 2007 to 2011, successive HAI point-prevalence surveys were performed annually in the hospital using the same methodology. The surveys were conducted by approximately 8 teams, and each team consisted of an infection control professional and 2—3 veteran clinical physicians. Each team performed HAI surveys on 3—5 wards after a 1-day training course on survey skills. Each point-prevalence survey lasted 1—2 days. During each survey, team members visited patients, reviewed their medical records, and finished the forms, overseen by the infection control professionals. The director of the department of hospital infection control guided all surveys and was also responsible for giving methodological assistance when needed.

Demographic and clinical data

Information such as sex, age, present diagnoses, HAI status, sites of infection, results of microbiological cultures, and antibiotic treatments received were recorded for each patient. The survey sought information on risk factors and clinical features, including the presence of any suspicious infection symptoms such as fever, sputum, coughing, or diarrhea, among others, along with pertinent physical examination and laboratory data, such as cultures, chest x-rays, or white cell blood counts. Every in-patient was recorded on the day of the survey, but because some laboratory results were unavailable on the day of the survey, the team would follow up on the reports and would review decisions pertaining to the infection in question. The purposes of the antibiotics administered were classified using what the physicians wrote in the patients' charts. In these surveys, antimicrobial prophylaxis was defined as giving a certain amount of antibiotics to patients at high risk of infection to prevent infection before infections actually occurred. The entire time reviewed each suspected case of infection. According to the case records and the patients' symptoms, microorganism reports were sorted into colonizers or pathogenic bacteria implicated in infections. In this paper, only microorganisms causing infection were reported; no colonizers were included.

Laboratory data

Organisms were identified using the conventional methods employed locally. If microbial culture reports were unavailable on the day of the survey, the team would follow up on the reports and would remake decisions regarding infection status.

Data analyses

The point-prevalence of infections was expressed as the total number of HAIs per 100 surveyed patients who had been either hospitalized for at least 48 h or admitted in the previous 7 days, with corresponding 95% confidence intervals (95% CIs). The control cases were the patients without HAIs. Bartlett's Chi-squared test was used to evaluate the inequality of variances. When $P < 0.05$ (two-tailed), variances were considered non-homogeneous. Logistic regression was used for determining the risk factors independently associated with HAI. Univariate and multivariate logistic

Table 1 Prevalence of HAI and antibiotic use by departments in a University Hospital in China.

Variables	2007 ($n = 1423$)	2008 ($n = 1399$)	2009 ($n = 1823$)	2010 ($n = 2282$)	2011 ($n = 2606$)	Overall ($N = 9533$)
% of patients with HAI [95%CI]	2.88 [2.01–3.75]	3.43 [2.48–4.38]	2.96 [2.18–3.74]	2.85 [2.17–3.53]	3.03 [2.37–3.69]	3.01 [2.67–3.35]
% of HAI [95%CI]	2.95 [2.07–3.83]	3.65 [2.66–4.63]	3.07 [2.28–3.86]	2.98 [2.28–3.68]	3.22 [2.55–3.90]	3.16 [2.81–3.51]
RTI (%)	2.39	2.79	2.03	2.37	2.26	2.34
SSI[a] (%)	0.32	0	1.00	0.09	0.61	0.43
UTI (%)	0.28	0.21	0.27	0.31	0.31	0.28
ACI (%)	0.14	0.29	0.16	0.18	0.19	0.19
STI (%)	0	0.07	0.11	0.09	0.04	0.06
BSI (%)	0	0.14	0.05	0	0.08	0.05
Other infections (%)	0	0.14	0	0	0.08	0.04
Antibiotic use, % of patients	49.75	57.18	44.27	48.55	43.63	47.83
Purpose of antibiotic use (% of patients)						
Treatment	54.80	65.88	60.59	40.52	53.47	53.97
Prevention	30.65	23.00	27.51	40.88	33.25	31.89
Treatment + prevention	14.55	11.12	11.90	18.59	13.28	14.14

RTI = respiratory tract infections, SSI = surgical site infections, UTI = urinary tract infections, ACI = alimentary canal infections, STI = skin and soft tissue infections, BSI = bloodstream infections, other infections = including parotitis, chickenpox, nerve system infections, deep organ infections, and those HAI not included in aforesaid cases.

[a] SSI: as the number of SSI per 100 in-patients in the surgical departments.

Table 2 Prevalence of HAI by groups: univariate and multivariate analysis (logistic regression).

Class (No. of patients)	Patients with HAI% [95%CI]	OR [95%CI]	Multivariate OR[a] [95% CI]
Categorization of present diagnoses			
Others[b] ($N = 740$)	1.22 [0.43–2.01]	1	1
Neoplasms ($N = 1452$)	3.65 [2.69–4.61]	3.08 [1.51–6.27], $P = 0.001$	2.95 [1.47–5.14], $P = 0.001$
Blood and blood-forming organs ($N = 169$)	5.92 [2.36–9.47]	5.11[2.04–12.78], $P < 0.001$	5.13[2.07–12.70], $P < 0.001$
Endocrine, nutritional and metabolic diseases ($N = 452$)	2.43 [1.01–3.85]	2.03 [0.83–4.93], $P = 0.112$	2.13 [0.84–4.93], $P = 0.151$
Nervous system ($N = 536$)	4.10 [2.42–5.78]	3.48 [1.59–7.61], $P = 0.001$	3.44 [1.51–7.67], $P = 0.001$
Circulatory system ($N = 1496$)	3.21 [2.32–4.10]	2.69 [1.31–5.52], $P = 0.005$	2.79 [1.71–4.56], $P = 0.003$
Respiratory system ($N = 784$)	3.83[2.48–5.17]	3.23 [1.52–6.85], $P = 0.001$	3.28 [1.57–5.96], $P = 0.001$
Digestive system ($N = 1524$)	2.43[1.66–3.20]	2.02[0.97–4.21], $P = 0.055$	2.01 [0.98–4.20], $P = 0.058$
Genitourinary system ($N = 857$)	1.75 [0.87–2.63]	1.45 [0.63–3.33], $P = 0.382$	1.48 [0.61–3.37], $P = 0.350$
Injury, poisoning and certain other consequences of external causes ($N = 1523$)	3.41 [2.50–4.33]	2.87 [1.41–5.86], $P = 0.003$	2.47 [1.30–5.44], $P = 0.005$
Sex			
Female ($N = 3514$)	2.76 [2.22–3.30]	1	1
Male ($N = 6019$)	3.16 [2.72–3.60]	1.15 [0.90–1.47], $P = 0.27$	1.18 [0.91–1.48], $P = 0.22$
Age			
14 years ($N = 894$)	2.80 [1.72–3.88]	2.05 [0.88–4.78], $P = 0.09$	2.60 [0.89–4.45], $P = 0.17$
15–24 years ($N = 506$)	1.38[0.37–2.40]	1	1
25–44 years ($N = 1656$)	1.81 [1.17–2.45]	1.32 [0.57–3.01], $P = 0.516$	1.31 [0.52–2.97], $P = 0.451$
45–64 years ($N = 3638$)	3.16 [2.59–3.73-]	2.33 [1.08–5.02], $P = 0.027$	2.34 [1.08–5.12], $P = 0.021$
65–74 years ($N = 2097$)	3.43 [2.65–4.21]	2.53[1.16–5.54], $P = 0.016$	2.58 [1.46–5.85], $P = 0.022$
≥75years ($N = 742$)	5.12 [3.54–6.71]	3.85 [1.70–8.69], $P < 0.001$	3.96 [1.80–8.88], $P < 0.001$
Hospital area			
Others[c] ($N = 1287$)	1.24 [0.64–1.85]	1	1
Departments of internal medicine ($N = 3188$)	3.89 [3.22–4.56]	3.21 [1.90–5.43], $P < 0.001$	2.82 [1.56–4.37], $P < 0.001$
Departments of surgery ($N = 4211$)	2.49 [2.02–2.96]	2.03 [1.20–3.45], $P = 0.008$	1.76 [1.11–3.03], $P = 0.008$
Departments of pediatrics ($N = 756$)	2.51 [1.40–3.63]	2.05 [1.05–4.01], $P = 0.033$	1.54 [0.98–2.54], $P = 0.075$
Intensive care units ($N = 91$)	25.27 [16.35–34.20]	26.87 [13.57–53.20], $P < 0.001$	15.87 [8.52–37.44], $P = 0.002$

OR, odds ratio; CI, confidence interval.

[a] Adjusted for all variables on the model.

[b] Refers to all admission diagnoses not included in the listed categories.

[c] Refers to departments of Chinese traditional medicine, dentistry, ENT [ears, nose and throat] medicine, ophthalmology, and dermatology.

regression analyses were performed to identify the risk factors for HAI. Risk was expressed as crude and as adjusted odds ratios (ORs) with 95% confidence intervals (CIs). Statistical analysis was performed using SAS, version 8.2 (SAS Institute Inc, Cary, NC). Differences in proportions of HAIs (with 95% CI) in the successive study periods were determined.

Results

Prevalence and infection sites

In total, 9533 patients were included in the surveys from 2007 to 2011. Of these patients, 63.14% were male, with a mean age of 43.10 years (ranged from 1 day to 91 years). There were 287 patients with HAIs, with an overall prevalence of 3.16 HAIs per 100 patients (301/9533, 95% CI, 2.81—3.51). The overall rates of HAIs in our study ranged from 2.85% to 3.43% according to year. There was no significant difference between the overall prevalence of HAIs and HAIs from 2007 to 2011 ($\chi^2 = 1.153$, $p = 0.886$). Proportionally, RTIs were the most common infections (223 cases [74.09%]), followed by UTIs (27 cases [8.97%]), SSIs (18 cases [5.98%]), and ACIs (18 cases [5.98%]). In the successive 5 surveys, 47.83% (4560/9533) of the patients received antibiotics (Table 1).

Risk factors

The distributions of HAIs varied among different diseases. Patients with blood-based diseases or disease in organs involved in producing blood had the highest prevalence of HAIs (10/169, 5.92%), followed by patients with diseases of the nervous system (22/536, 4.10%) and with diseases of the respiratory system (30/784, 3.83%). The prevalence of patients older than 75 years with HAIs was higher (38/742, 5.12%) than the other age brackets. The prevalence of HAIs developing in patients in ICUs (23/91, 25.27%) was higher than that of HAIs in patients in other departments. The risk factors for HAIs, along with their univariate ORs and multivariate ORs, are shown in Table 2. In the multivariate analysis, statistically significant associations were identified for the following factors: categorization of present diagnoses, age, and type of hospital area.

Microorganisms discovered

In these surveys, most HAI episodes were diagnosed by physical symptoms and radiographs, with only 42.19% (127/301) receiving positive test results and only 135 pathogenic bacteria types being isolated. Gram-negative bacteria were isolated most frequently. Overall, the most commonly isolated organism was *Pseudomonas aeruginosa*, followed by *Escherichia coli*, *Acinetobacter baumannii*, and *Staphylococcus aureus*. In RTI patients, *P. aeruginosa* and *A. baumannii* were the most commonly isolated pathogens, followed by fungi, particularly *Candida albicans*. In patients with SSIs, *S. aureus* were the most common pathogens, followed by *Klebsiella pneumoniae*. Fungi and *E. coli* were the most common pathogens for UTIs (Table 3).

Antibiotic use

Of the patients included in these surveys, 47.83% were receiving antimicrobial treatment on the survey days. The highest rate was 57.18% in 2008, and the lowest rate was 43.63% in 2011; the difference was statistically significant from 2007 to 2011. Of these patients, 3001 (65.80%) patients used one antibiotic, 1486 (32.59%) patients took two, and 73 (1.61%) patients took three or more than three. The following antibiotics were the most commonly used for treatment or prevention: cephalosporin (2645 [58.00%]), penicillin (1048 [22.98%]), and quinolone (638 [13.99%]). Cephalosporin and penicillin were the antibiotics most frequently used in the ICU, and cephalosporin was the most frequently used antibiotic in medical, surgical, and pediatric wards.

Discussion

The surveillance of HAIs is important for justifying the implementation and subsequent evaluation of infection prevention and control policies and measures [7—9]. Moreover, monitoring HAIs is of great significance for establishing prevention measures. The 5 successive point-prevalence surveys may be the most accurate approach to obtain HAI data, considering the extensive labor, time, and financial resources required [3,4,10]. Among patients, the distributions of infections varied by diseases, genders, age, and hospital departments. The results indicated that the differences in HAI prevalence in the 5 surveys in the hospital were statistically nonsignificant and that the overall prevalence of HAIs in the hospital was 3.16%, which was lower than that reported in other studies in Hubei (4.14%) [12], in the nationwide survey conducted in China (4.77%) [13] and in surveys conducted in other countries (5.1—16.8%) [3,11,14—16]. In contrast to studies in

Table 3 Distribution of pathogens in a University Hospital in China.

Pathogen	No. of pathogens (%), by infection sites					Total
	RTI	SSI	UTI	ACI	Others	
Gram-negative bacteria	73	11	2	2	2	90
Pseudomonas aeruginosa	27	2	0	1	0	30
Escherichia coli	10	2	2	1	2	17
Klebsiella pneunoniae	8	5	0	0	0	13
Acinetobacter baumannii	17	0	0	0	0	17
Pseudomonas maltophilia	6	0	0	0	0	6
Others	5	2	0	0	0	7
Gram-positive bacteria	12	10	1	1	0	24
Staphylococcus aureus	7	6	0	0	0	13
Enterococcus spp.	0	2	1	1	0	4
Streptococcus	2	2	0	0	0	4
Others	3	0	0	0	0	3
Fungus	11	0	3	0	0	14
Candida albicans	8	0	1	0	0	9
Others	3	0	2	0	0	5
Others	2	2	1	1	1	7
Total	98	23	7	4	3	135

RTI, respiratory tract infections; SSI, surgical site infections; UTI, urinary tract infections; ACI, alimentary canal infections; Other infections, including bloodstream infections, skin and soft tissue infections, nerve system infections, deep organ infections, and those HAI not included in aforesaid cases.

other countries that implicated UTIs as the most common HAIs [14,15], we found that the respiratory tract was the most frequent HAI site, which was consistent with the results of other studies in China, Greece, and Italy [3,12,13,16]. The differences between the prevalence data reported by some publications and our survey may be explained by the differing average lengths of stay, definitions of clinical conditions used, areas, sizes of hospitals, and surveillance methods performed for measuring HAIs [17].

Gram-negative bacteria were more commonly isolated than were Gram-positive bacteria in our study, which is in accordance with reports from other studies [3,12,13,18]. The overall prevalence of patients receiving antibiotics treatment was 47.83%. In our 2011 survey, the prevalence dropped to 43.63%, which was likely the result of antibiotic management policies initiated by the Ministry of Health throughout the country. The new policies began in May of 2011 and banned antibiotics overuse and reduced antibiotics consumption. The increasingly stringent policies regarding antimicrobial drug use included tight restrictions on antimicrobial use conditions and restrictions on defined daily dose (DDD) values under 40, limited antibacterial drug varieties to fewer than 60 in a hospital, and severed economic connections between pharmaceutical companies and doctors. The impact of this policy on HAI prevalence is not yet clear; we need more time to make observations.

In the 5 surveys of patients using antibiotics, 31.89% of cases were attributed to prophylaxis. In a European surveillance of antimicrobial consumption in 20 hospitals, 30.1% of in-patients were receiving antibacterial treatment on the day of the survey [19]. Antibiotic resistance has become an important public health issue worldwide, including in China, and it is crucial for all medical staff to be aware of the relationship between antibiotic consumption and the emergence of resistance.

Regrettably, due to constraints of time and personnel, not all factors potentially associated with HAIs were considered in the study design.

Conclusion

In conclusion, the current successive point-prevalence survey yields data on the trend of HAI prevalence, epidemical character, and the use of antibiotics among in-patients in a university hospital. With this data, we can initiate targeted programs of infection prevention and control.

Conflicts of interest

Funding: No funding sources.

Competing interests: None declared.

Ethical approval: Not required.

Acknowledgments

We would like to thank the staff members who collected the patient data in Taihe Hospital.

References

[1] Gaynes R, Richards C, Edwards J. Feeding back surveillance data to prevent hospital-acquired infections. Emerging Infectious Diseases 2001;7:295—8.
[2] Burke JP. Infection control—a problem for patient safety. New England Journal of Medicine 2003;348:651—6.
[3] Gikas A, Pediaditisy J, Papadakis JA, Starakis J, Levidiotou S, Nikolaides P. Prevalence study of hospital-acquired infections in 14 Greek hospitals: planning from the local to the national surveillance level. Journal of Hospital Infection 2002;50:269—75.
[4] Hopmans TEM, Blok HEM, Troelstra A, Bonten MJM. Prevalence of hospital-acquired infections during successive surveillance surveys conducted at a university hospital in The Netherlands. Infection Control and Hospital Epidemiology 2007;28:459—65.
[5] Sánchez-Payá J, Bischofberger C, Lizan M, Lozano J, Munoz Platon E, Navarro J. Nosocomial infection surveillance and control: current situation in Spanish hospitals. Journal of Hospital Infection 2009;72:50—6.
[6] Garner JS, Jarvis WR, Emori TG, Horan TC, Hughes JM. CDC definitions for nosocomial infections, 1988. American Journal of Infection Control 1988;16:128—40.
[7] Cauët D, Quenon JL, Desvé G. Surveillance of hospital acquired infections: presentation of a computerised system. European Journal of Epidemiology 1999;15:149—53.
[8] Wilson1 APR, Hodgson1 B, Liu M, Plummer D, Taylor I, Roberts J. Reduction in wound infection rates by wound surveillance with postdischarge follow-up and feedback. Britesh Journal of Surgery 2006;93:630—8.
[9] Bärwolff S, Sohr D, Geffers C, Brandt C, Vonberg RP, Halle H. Reduction of surgical site infections after caesarean delivery using surveillance. Journal of Hospital Infection 2006;64:156—61.
[10] Glenister HM, Taylor LJ, Bartlett CL, Cooke EM, Sedgwick JA, Mackintosh CA. An evaluation of surveillance methods for detecting infections in hospital inpatients. Journal of Hospital Infection 1993;23:229—42.
[11] Zarb P, Coignard B, Griskeviciene J, Arno M, Vanessa V, Herman G. The European Centre for Disease Prevention and Control (ECDC) pilot point prevalence survey of healthcare-associated infections and antimicrobial use. Eurosurveillance 2012;17(November (1546)), pii: 20316.
[12] Lu Y, Cheng LM, Hu YH, WEN YL, LI MN. Prevalence rate of nosocomial infection in 2010: investigation and analysis [in Chinese]. Chinese Journal of Nosocomiology 2011;21(6):1101—3.
[13] Wu AH, Ren N, Wen XM, Yi XY, Huang X, Xu XH. One-day prevalence survey of nosocomial infection in 159 hospitals [in Chinese]. Canadian Journal of Infection Control 2005;4(1):12—7.
[14] Eriksen HM, IversenBG, Aavitsland P. Prevalence of nosocomial infections in hospitals in Norway, 2002 and 2003. Journal of Hospital Infection 2005;60:40—5.
[15] Faria S, Sodano L, Gjata A, Dauri M, Sabato AF, Bilaj A. The first prevalence survey of nosocomial infections in the University Hospital Centre 'Mother Teresa' of Tirana, Albania. Journal of Hospital Infection 2007;65:244—50.
[16] Lanini S, Jarvis WR, Nicastri E, Privitera G, Gesu G, Marchetti F. Healthcare-associated infection in Italy: annual point-prevalence surveys, 2002—2004. Infection Control and Hospital Epidemiology 2009;30:659—65.
[17] Xie DS, Xiong W, Xiang LL, Fu XY, Yu YH, Liu L. Point-prevalence of healthcare-associated infection surveys conducted at 13 Hospitals in Hubei Province of China, 2007 and 2008. Journal of Hospital Infection 2010;76:150—5.
[18] Wang A, Fan S, Yang Y, Shen X. Nosocomial infections among pediatric hematology patients: results of a retrospective incidence study at a pediatric hospital in China. Journal of Pediatric Hematology/Oncology 2008;30:674—8.
[19] Ansari F, Erntell M, Goossens H, Davey P. The European Surveillance of Antimicrobial Consumption (ESAC) point-prevalence survey of antibacterial use in 20 European hospitals in 2006. Clinical Infectious Diseases 2009;49:1496—504.